STUDIES IN THE TAXONOMY AND DISTRIBUTION OF THE EASTERN NORTH AMERICAN SPECIES OF LOBELIA

Rogers McVaugh

(*Continued from page 329*)

14. L. Gattingeri Gray, Proc. Am. Acad. Arts Sci. XVII: 221. 1882. Type Locality: "Middle Tennessee" (LaVergne, Rutherford Co.). Type Specimen: *Curtiss 1637* (distr. as *L. leptostachys*); in Gray Herbarium. Stem erect, 15–55 cm. high (ave. about 30 cm.), unbranched, or often with 1–6 filiform upright axillary branches, each bearing a few flowers; green, or with a brownish-red tinge near the base; nearly smooth, except for a few chaffy hairs near the base, on the angles formed by the decurrent leaf-bases. Cauline leaves 1–7, very thin in texture, practically smooth, sessile or even somewhat clasping; ovate to oblong, broadest below the middle, obtuse or the upper short-acute, irregularly sharply and finely toothed; in size to 2.0 × 4.5 cm., the upper little smaller, with an abrupt change to the bracts of the inflorescence. Basal leaves if present 1–5, obovate, obtuse, nearly smooth, narrowed at the base. Annual, acc. to Mohr (1901). Inflorescence a terminal raceme, 5–27 cm. long (ave. about 15 cm.), usually distinctly secund, bearing 15–55 (ave. about 30) flowers upon short curved pedicels (4–6 mm. long in fruit), which are nearly smooth, each with a pair of inconspicuous bracteoles near the base. Flower-bracts smooth, linear, callose-denticulate, longer than the pedicel (8–10 mm. long or less). Calyx in anthesis campanulate, smooth, becoming long-campanulate in fruit, with a smooth, inflated appearance, 3.5–4.5 mm. across by 5–6 mm. long. Capsule ⅔ or more inferior, horizontal or somewhat pendent at maturity. Calyx-lobes narrowly lance-linear, about 5 mm. long, smooth, or rarely ciliate near the tip; auricles none, or in a few cases distinct, short-triangular. Flower 10–13 mm. long (ave. 12 mm.), including calyx. Corolla light violet-blue or lilac, smooth outside, pubescent inside at the base of the lower lip. Corolla-tube entire, except for the dorsal fissure; lobes of the lower lip broad-ovate, about as long as the tube; two upper lobes shorter, lanceolate. Filament-tube 2.0–3.5 mm. long, nearly smooth, united about half its length above, somewhat deflexed. Anther-tube 1.9–2.5 mm. long, bluish-gray, the two smaller anthers slightly tufted, the three larger usually pubescent on the backs.—Springy places of calcareous bluffs; cedar barrens. Now known only from three counties in the limestone region of central Tennessee. Flower May–June. Material seen: Tennessee: Davidson: Nashville, *Gattinger* (ANS, G); Rutherford: Rockville, *Sudworth*, May 1897 (US); LaVergne, *Gattinger* (Curtiss 1637*) (ANS, CM, G, M, Mo, NB, US). Many herbaria have specimens from LaVergne, collected by Gattinger and distributed in various ways. The type, *Curtiss 1637*,

is presumably from LaVergne, but is labelled merely "middle Tennessee" (seen in ANS, G, M). WILSON: Lebanon, *Biltmore herb.*, Aug. 1899 (US); Lebanon, *Pennell 11384* (ANS); *11391* (ANS, UP).

15. L. FLACCIDIFOLIA Small, Bull. Torr. Bot. Club XXIV: 338. 1897. TYPE LOCALITY: Ochlockonee River Swamp, Thomasville, Thomas Co., Ga. TYPE SPECIMEN: *Small*, Jy. 12–22, 1895; in New York Botanical Garden. Stem slender, erect, simple or with several filiform branches bearing a few flowers each, 30–90 cm. high, smooth or sparsely hirsute, green, or reddish below. Leaves cauline, thin, few–15, smooth, sub-entire, with numerous obscure shallow (often crenate) callose teeth; in size 0.5–1.5 × 5–11 cm., lanceolate or long-oblong, short-acute at the tip, mostly rather abruptly narrowed at base, the lower short-petiolate. Floral bracts definitely smaller than the leaves; larger leaves well below the inflorescence. Inflorescence a loose terminal raceme, sometimes plainly secund, few–30 cm. long, bearing 3–20 flowers (when branched, the branches developing later than the main inflorescence, with 1–8 flowers each). Pedicels rough, slender, curved, 4–11 mm. long in fruit, each with a pair of conspicuous green smooth or ciliate bracteoles near the middle or below. Flower-bracts linear, smooth, denticulate, about equalling the pedicels. Calyx in anthesis short-campanulate, somewhat rough-puberulent, becoming hemispheric in fruit, strongly ribbed. Capsule more than half inferior, longer than wide, 4–6 mm. in diameter. Calyx-lobes narrowly sagittate, acute or acuminate, ciliate, usually glandular-toothed, 3–5 (7) mm. long; auricles reflexed, round, small, but conspicuous, 1 mm. or less long. Flower 14–19 mm. long (ave. 15–16 mm.), including calyx. Corolla blue, pubescent outside or smooth, the lower lip somewhat pubescent at the base, with two tubercles. Corolla-tube entire, except for the dorsal fissure, or fenestrate; lobes of the lower lip oblong or narrow-ovate, nearly as long as the tube; two upper lobes lanceolate, erect. Filament-tube 5–6 mm. long, pubescent below, connate more than half its length above. Anther-tube 2.0–2.5 mm. long, bluish-gray, the two smaller anthers tufted at the tips, the three larger pubescent on the backs.—River swamps, Coastal Plain, Georgia, northern Florida, Alabama. Flower June–September. Material seen: GEORGIA: COLQUITT: Moultrie, *Harper 1676* (Mo, NB). JOHNSON: Wrightsville, *Harper 1341* (Mo, NB); (most of these specimens are not to be distinguished from *L. Halei* Small). THOMAS: Thomasville, *Small*, Jy. 1895 (NB). FLORIDA: "Ad ripas fluv. Ocklockonne," *Rugel*, Jy. 1843 (NB). OKALOOSA: Milligan, *Curtiss 6855* (Del, M, Mo, NB, UP). ALABAMA: MOBILE: Spring Hill, *Graves 1273* (Mo).

There is some evidence to show that this species and the next are the same, and intergrade freely (cf. the plant cited above, *Harper 1341*). However, *L. flaccidifolia* differs by the thinner, more oblong leaves, greater tendency to branch, smaller and more numerous flowers, and a somewhat later flowering period; in view of these differences, it seems

best to keep them as separate species, at least until more material is seen.

16. L. Halei Small, Fl. S.E.U.S. 1145. 1903. Type Locality: "wet prairies, western Louisiana; Texas, near Houston." Type Specimen: authentic material, collected by J. Hale at Alexandria, La., and identified by Asa Gray as *L. Ludoviciana*, seen at the Gray Herbarium.—*L. Ludoviciana* Gray, Proc. Am. Acad. Arts Sci. XII: 60. 1877; not *L. Ludoviciana* Wood, Class Book 476. 1861.—Stem erect, smooth or nearly so, simple or with 1–2 stout upright branches, 30–100 cm. high, green, or reddish near the base. Cauline leaves few–20, smooth, somewhat appressed to the stem, the lower petiolate; oblanceolate, short-acute below, about 1.0 × 5–8 cm.; becoming lance-acute above; subentire or sharply toothed. Upper leaves bract-like, distant; the larger leaves well below the inflorescence. Inflorescence a terminal raceme to 35 cm. long, not noticeably secund, loosely 5–30 flowered. Pedicels rough, curved, 5–8 mm. long in fruit, each with a pair of conspicuous green smooth or ciliate bracteoles about the middle or below. Flower-bracts smoothish, linear, callose-denticulate, about as long as the pedicels. Calyx in anthesis short-campanulate or hemispheric, rough-puberulent, becoming hemispheric in fruit, strongly ribbed, about 4.5 mm. in diameter. Capsule half inferior, longer than wide. Calyx-lobes broad-sagittate, flat, acute or acuminate; smooth, at least near the tip, usually callose-denticulate, 4–6 mm. long. Auricles round, conspicuous, less than 1 mm. long. Flower 15–20 (22) mm. long, including calyx. Corolla blue, pubescent outside, the lower lip pubescent at the base inside. Corolla-tube entire except for the dorsal fissure; lobes of the lower lip ovate, short-acute, nearly as long as the tube; two upper lobes lanceolate, shorter, erect. Filament-tube 6–8 mm. long, pubescent below, connate above. Anther-tube 2.5–3.0 mm. long, light bluish-gray, the two smaller anthers densely white-tufted at tip, the three larger heavily pubescent on the backs.—Wet prairies,

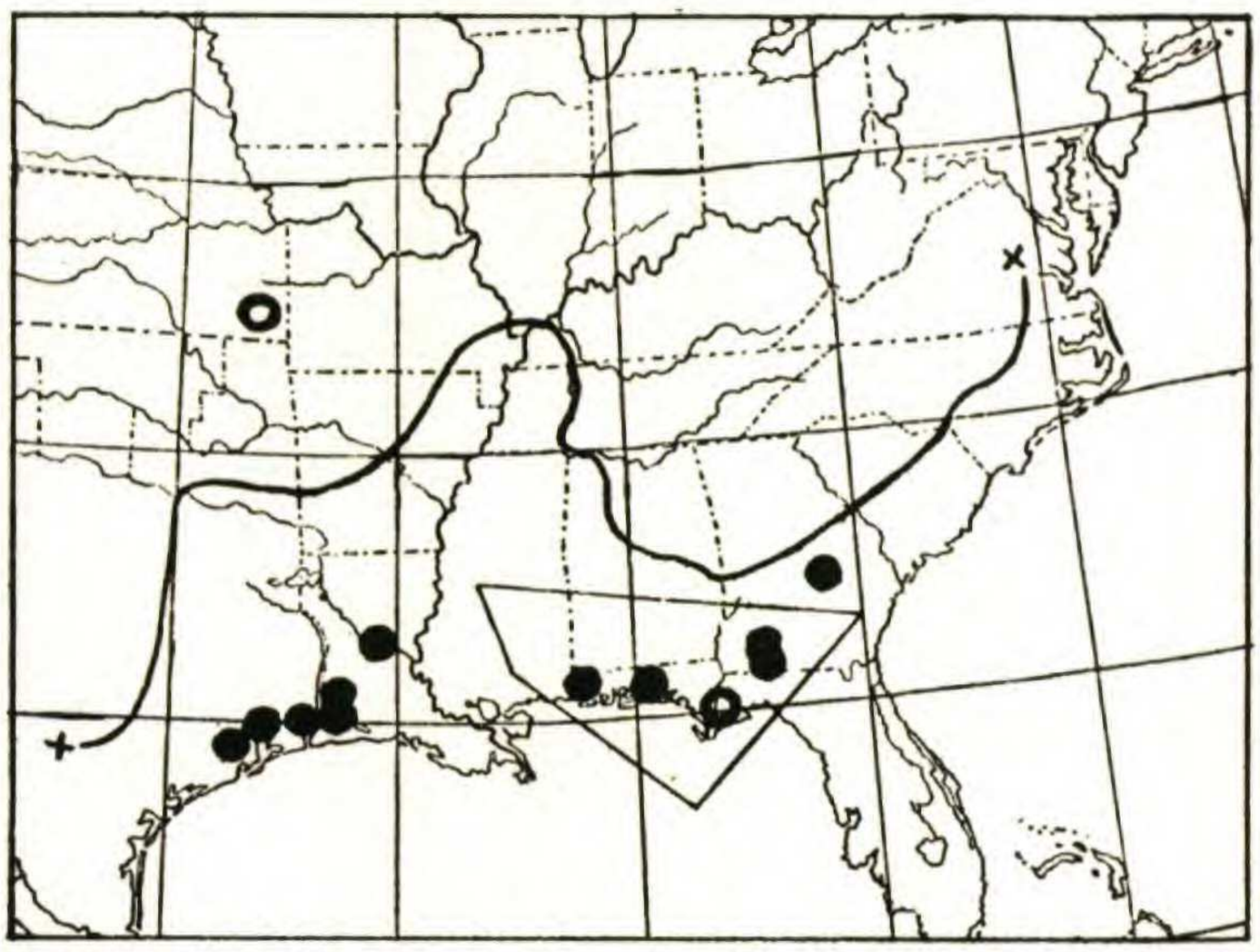

Fig. 24. Range of Lobelia Halei (unframed) and (framed) of L. flaccidifolia. Open dots represent doubtful records.

usually in sandy soil, Coastal Plain, Louisiana and eastern Texas; doubtfully north to Kansas. Flower April–July. Material seen: LOUISIANA: "Cigers Point, W. La.," *Langlois*, May 1886 (NB). CALCASIEU: Sulphur, *Palmer 7722* (NB); DeQuincy, *Pennell 10226* (UP). RAPIDES: Alexandria, *J. Hale* (ANS, G, NB). TEXAS: *F. Lindheimer, Fasc. I. 116.*, ann. 1843 (ANS). HARRIS: Houston, *Lindheimer 41* (Mo). LIBERTY; *Tharp 2506* (US). ORANGE: Orange, *Tharp 2733* (US). KANSAS: LABETTE: Parsons, *Letterman*, Jy. 1880 (Mo); this specimen is apparently *L. Halei*, but there may be some confusion as to locality.

17. L. FLORIDANA Chapman, Bot. Gaz. III: 9. Feb. 1878. TYPE LOCALITY: "Margins of ponds and swamps in the pine forests of West Florida." TYPE SPECIMEN: material from Chapman seen in the New York Botanical Garden and the United States National Herbarium.—*L. paludosa* var. *floridana* Gray, Syn. Fl. II. pt. I: Suppl. 394. 1886. —Stem erect, slender, or rather coarse in large specimens, unbranched (or often with several stout upright or spreading branches, developing later than the main axis, and bearing fewer flowers); smooth, 50–150 cm. high (ave. 80–100 cm.), green or stramineous, less often purplish at base. Leaves basal, 1–10, smooth, strap-shaped, oblanceolate or lanceolate, acute or obtuse at tip, long drawn-out at base into margined petioles; to 2.5 × 40.0 cm. (ave. about 1 × 25 cm.); more or less upright; entire or shallowly crenate, or dentate with callose teeth. Stem-leaves bract-like, 3–4, lanceolate, 2–3 cm. long, acute, distant, callose-denticulate; the lowest sometimes larger, to 0.5 × 8.0 cm. Inflorescence a terminal raceme (sometimes with secondary, shorter racemes in branched individuals), 10–50 cm. long, loosely or rather densely 10–40 flowered (ave. about 25); not secund. Pedicels stout, rough, more or less upright, 3–6 mm. long in fruit, each with a pair of inconspicuous bracteoles at the base. Flower-bracts smooth, linear, shorter than the pedicels or equalling them, inconspicuous. Calyx in anthesis flattish or conic, usually rough under a lens, becoming hemispheric in fruit (some-

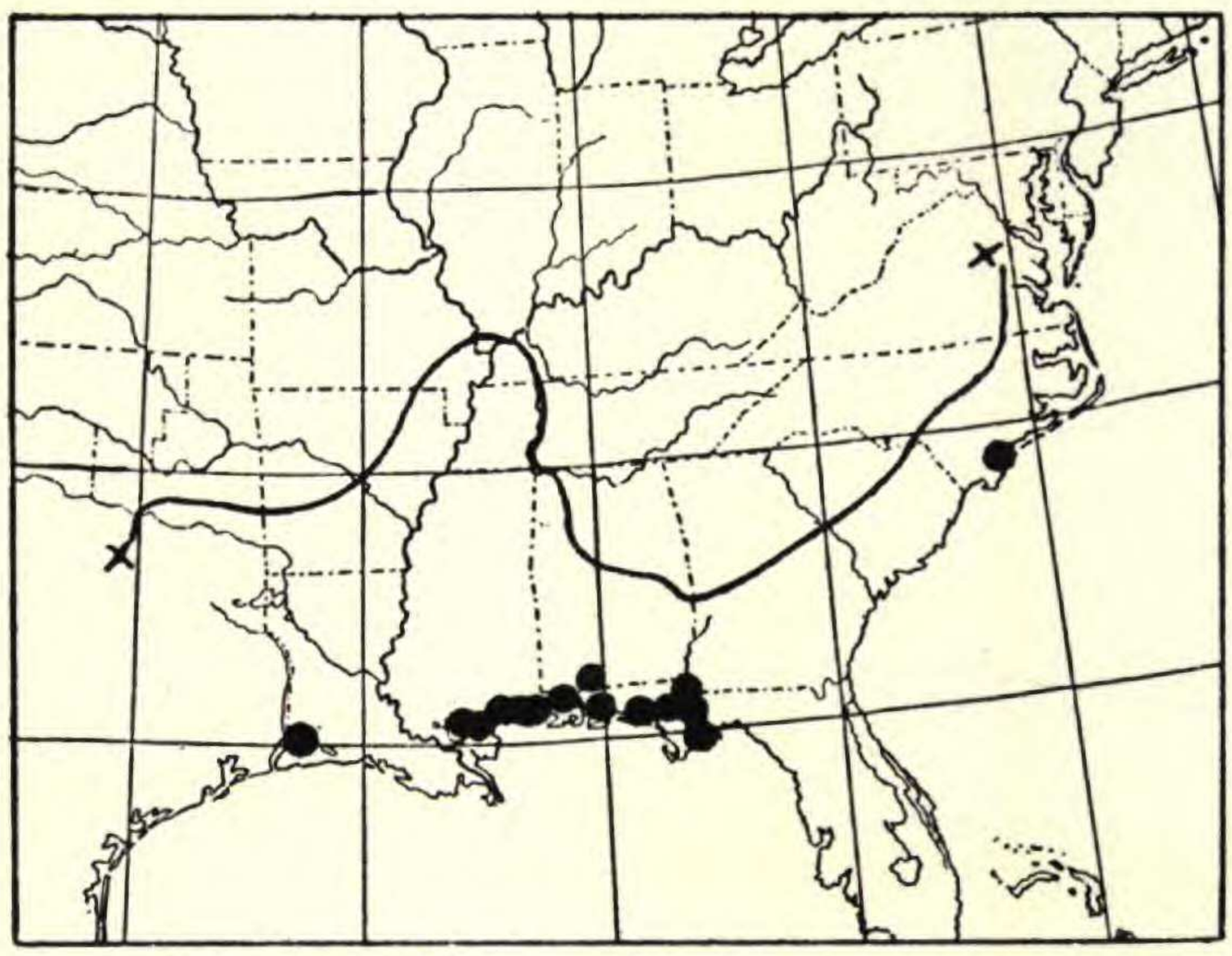

FIG. 25. Range of LOBELIA FLORIDANA.

times acute at base), about 4.0 mm. in diameter or larger. Capsule about ⅔ inferior, higher than broad. Calyx-lobes broad-lanceolate or deltoid, 2–6 mm. long, smooth, acute, usually callose-denticulate (often obscurely so). Auricles very small, triangular. Flower 13–20 mm. long (ave. 15–16 mm.), including calyx. Corolla blue, usually pubescent outside, the lower lip densely hirsute-pubescent at base inside. Corolla-tube entire except for the dorsal fissure (rarely fenestrate); lobes of the lower lip ovate, short-acute, reflexed, shorter than the tube; two upper lobes lanceolate, erect. Filament-tube 6–11 mm. long (ave. 7.5–9.0 mm.), strongly deflexed, pubescent below, connate more than half its length above. Anther-tube about 3.0 mm. long, light bluish-gray, the two smaller anthers tufted at the tips, the three larger merely pubescent on the backs.—Moist pinelands and borders of pineland and cypress ponds, often partially immersed; western Louisiana to north-western Florida and eastern North Carolina; near the coast. Flower May to August and September. Material seen: North Carolina: new hanover: Wilmington, *MacFarlane*, Jun. 1909 (UP). Florida: franklin: Apalachicola, *Chapman*, Biltmore herb. 4164a (NB, US). jackson: (probably Fla.); *Chapman*, Aug. 1838 (Torrey herb., NB). liberty: *Biltmore herb.*, Aug. 1901 (US). santa rosa: Milton, *Harper 45* (G, NB, US). walton: Point Washington, *Biltmore herb.*, Aug. 1891 (US). washington: Chipley, *Curtiss 6851* (Del, M, NB, US). Alabama: escambia: Flomaton, *Biltmore herb. 4164c* (US). mobile: Mobile, *Mohr* (US). Mississippi: hancock: Bay St. Louis, *Dr. Ingalls*, Torrey herb. (NB). harrison: Biloxi, *Tracy 4942* (Mo). jackson: Ocean Springs, *Pollard 1058* (NB, US). Louisiana: calcasieu: Lake Charles, *Allison 283* (NB, US). st. tammany: Covington, *Bro. Arsene 11883* (NB, US).

18. L. paludosa Nuttall, Gen. N. Am. Pl. II: 75. 1818. Type Locality: "In deep sphagnose swamps, from Sussex county in Delaware to Georgia." Type Specimen: authentic material in the Academy of Natural Sciences of Philadelphia. *L. pallida* Elliott, Sk. Bot. S. C. & Ga. I: 265. 1821 (in part). *L. nudicaulis* Rafinesque, Atl. Journ. I: 147. 1832.—In habit and vegetative characters hardly separable from *L. floridana*, but smaller; stem 20–135 cm. high (ave. 50–60 cm.); less freely branched; often purplish at base and at bases of leaves. Leaves basal, smaller, shorter (ave. size about 1 × 12 cm.), usually oblanceolate, short-acute (rarely with an ovate blade and a short petiole). Stem-bracts 1.0–2.5 cm. long (rarely 5.0 cm.). Inflorescence 2–35 cm. high (ave. about 15 cm.), loosely few–30 flowered (ave. about 15). Pedicels rough, not stiffly upright, rather slender, 5–9 mm. long in fruit, with no bracteoles visible under a lens. Flower-bracts shorter than the pedicels, linear. Calyx in anthesis conic, rough, becoming hemispheric in fruit, sometimes acute at base, 3.5–4.0 mm. in diameter. Capsule about ⅔ inferior, higher than broad. Calyx-lobes lanceolate or deltoid, acute, smooth, entire or callose-denticulate, about 3.0 mm. long. Auricles none or very small. Flower

11–16 mm. long, including calyx (ave. 12–13 mm.). Corolla light blue or nearly white, practically smooth outside, the lower lip densely hirsute-pubescent at base inside. Corolla-tube fenestrate; lobes of the lower lip ovate, little shorter than the tube, scarcely reflexed; two upper lobes lanceolate. Filament-tube 3.0–4.5 mm. long (ave. 3.5 mm.), hairy below, connate about half its length above, somewhat deflexed. Anther-tube 2–3 mm. long, light bluish-gray, the two smaller anthers tufted at tips, the three larger merely pubescent on the backs.

This species seems wholly distinct from the larger *L. floridana*. It may be distinguished by the shorter filament-tube, generally smaller size and smaller corolla; the fenestrate corolla; the absence of bracteoles on the pedicel.—Swamps and low pinelands and ponds, often partially immersed; southern Georgia and throughout peninsular Florida; reported (perhaps always upon the authority of Nuttall) from Delaware; the report may be based upon *L. Boykinii* T. & G., which occurs there. Flower February–May, or more or less throughout the year. Representative material seen: GEORGIA: CAMDEN: St. Marys, "*Bal.*," Schweinitz herb. (ANS). CHARLTON: Traders Hill, *Small*, Jun. 1895 (NB). FLORIDA: ALACHUA: Gainesville, *Crawford*, Apr. 1897 (ANS, Duke). BREVARD: "Indian River," *Palmer*, ann. 1874 (US). BROWARD: Ft. Lauderdale, *Meredith*, Mar. 1917 (ANS). CLAY: Hibernia, *Canby*, Mar. 1869 (ANS, NB, US). DADE: Miami, *Small 3261* (NB). DUVAL: Jacksonville, *Curtiss 4715* (Del, M, NB, NYS, US). FRANKLIN: Apalachicola, *Chapman*, Biltmore herb. 2679b (NB, US). GULF: Wewahitchka, *Leeds*, Apr. 1933 (ANS). HILLSBOROUGH: Tampa, *Garber*, May 1876 (NB, US). INDIAN RIVER: Fellsmere, *Small 8912* (NB). LAKE: Eustis, *Nash 501* (ANS, Del, M, NB, US). LEE: Ft. Myers, *Miss Standley 40* (ANS, CM, NB, US). LEON (or WAKULLA): "inter Tallahassee & St. Marks," *Rugel*, May 1843 (NB). LEVY: Bronson, *J. D. Smith*, Apr. 1880 (US). MANATEE: Bradentown, *Tracy 6864* (NB, US). OSCEOLA: Kissimmee Prairie, *Mearns*, Apr. 1901 (US). PALM BEACH: "Ft. Lauderdale to Lake Okeechobee," *Small 4111* (NB). PINELLAS: St. Petersburg, *Williams*, Apr. 1926 (ANS). POLK: *J. D. Smith*, Apr. 1880 (US). PUTNAM: Palatka, *Williamson*, Apr. 1894 (ANS). ST. JOHNS: St. Augustine, *Reynolds*,

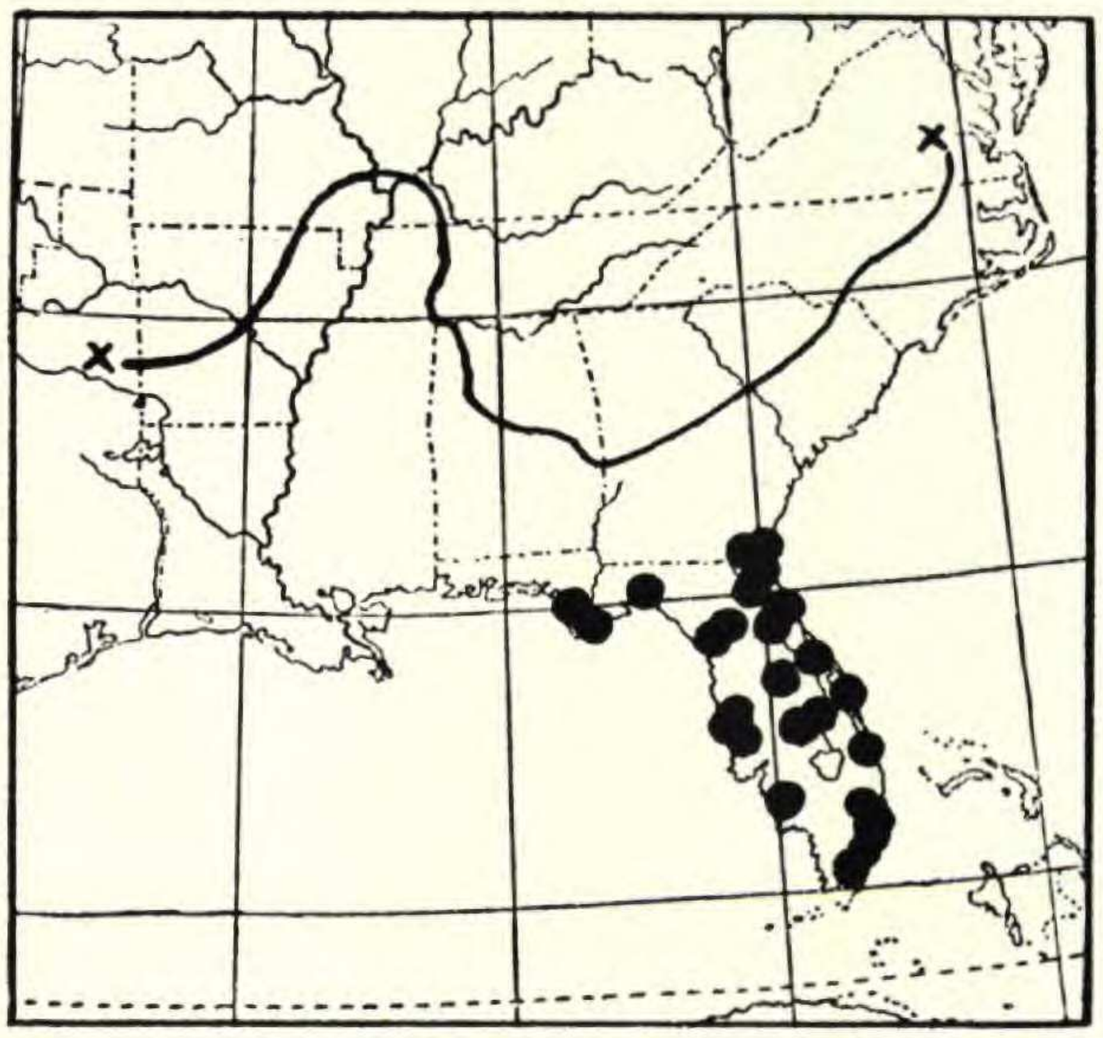

FIG. 26. Range of LOBELIA PALUDOSA.

May 1876 (Del, NB). SARASOTA: Sarasota, *Leeds*, Apr. 1931 (ANS). VOLUSIA: Lake Helen, *Mrs. Deam 1787* (M).

19. L. NUTTALLI Roem. & Schult., Syst. Veg. V: 39. 1819. TYPE LOCALITY: "On the dry margins of sandy swamps, from New Jersey to Carolina." TYPE SPECIMEN: authentic material of "*L. gracilis*" in the Academy of Natural Sciences of Philadelphia.—Perhaps the "*Rapuntium minimum flore pallide coeruleo: caulibus tenuibus infirmis*" of Gronovius, Fl. Virg. 134. ed. II. 1762. *L. Kalmii* Walter, Fl. Car. 218. 1788. *L. Kalmii*, var. *Caroliniana*, Michaux, Fl. Bor.-Am. II: 153. 1803. *L. gracilis* Nuttall, Gen. N. Am. Pl. II: 77. 1818. not *L. gracilis* Andrews, Bot. Rep. V: 340. 1803, which is an Old World species. *L. Kalmii*, var. *gracilis*, Barton, Fl. N. Am. I: plate 34. 1821.—Stem slender, erect, 20–75 cm. high, sometimes simple, but usually with one–several filiform racemose upright or spreading branches; smooth and green above, usually dark purplish-red and short-puberulent below. Cauline leaves few–20, smooth, rather thin, oblanceolate or ovate below, the upper lanceolate or linear; short-acute, or the lower obtuse; sub-entire in outline, but with shallow callose teeth; an average leaf about six times as long as wide; often 0.5 × 2.5 cm. (rarely 1.1 × 2.5–4.0 cm.). Basal leaves ovate, petiolate, more or less pubescent, to 1.0 × 1.5 cm. Petiole to 1 cm. long. Inflorescence a terminal raceme (in branched individuals a main raceme with several shorter secondary ones, developing later in the season); sometimes plainly secund, loosely few–20 flowered. Pedicels slender, flexuous, more or less upright, smooth or often prickly, 5–11 mm. long in fruit, each with a pair of bracteoles at the base. Flower-bracts equalling the pedicels or short (then 1–2 mm. long), smooth, nearly linear, somewhat denticulate. Calyx in anthesis flattish; often with few–numerous bristly hairs, sometimes smooth; becoming short-hemispheric in fruit, about 3.0 mm. in diameter. Capsule about half inferior. Calyx-lobes smooth, entire, narrow-lanceolate or deltoid, 2.0–3.5 mm. long. Auricles none. Flower 8–11 mm.

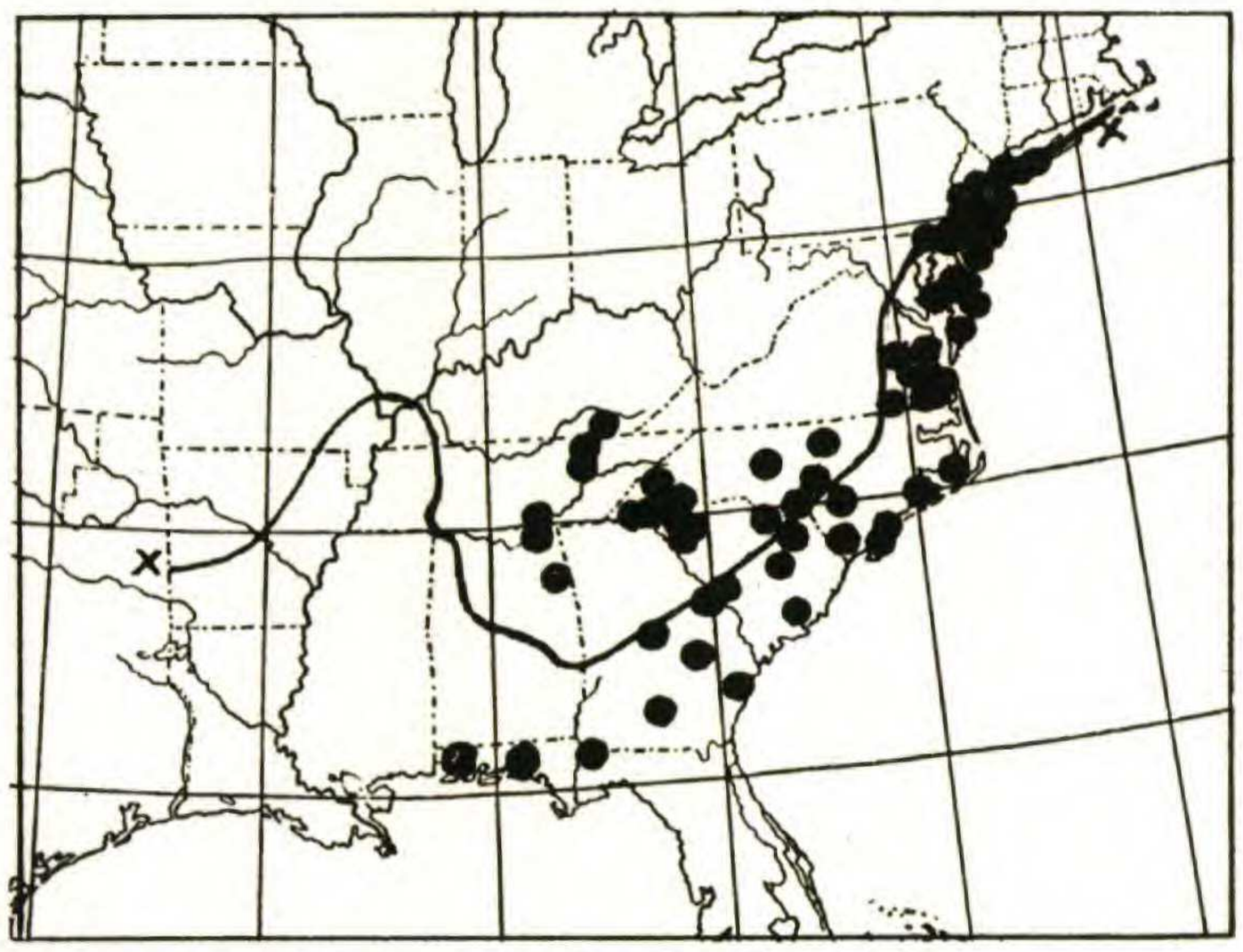

FIG. 27. Range of LOBELIA NUTTALLI.

long, including calyx. Corolla blue, with a white eye and two greenish tubercles at the base of the lower lip; smooth, or hairy inside the tube. Corolla-tube entire, except for the dorsal fissure; lobes of the lower lip narrow-ovate, shorter than the tube; two upper lobes lanceolate, curved upward. Filament-tube about 3.0 mm. long, pubescent below, connate more than half its length above. Anther-tube about 1.5 mm. long (1.0–1.8 mm.), bluish-gray, the two smaller anthers tufted at the tips, the three larger smooth or pubescent on the backs. Open sandy or grassy swamps, or woods, sometimes in brackish marshes, or dry sandy places; usually in acid situations; central Tennessee and Kentucky to Alabama (Mississippi, acc. to Small), Florida, north to southern Long Island. Appalachian Provinces and Coastal Plain; in Pennsylvania and New York confined to the Coastal Plain and the region south of the moraine. Flower July 1–September 1, from N. J. northward; fruit July 20–October. Southward flowering earlier, beginning May 20. Representative material seen: KENTUCKY: LAUREL: Sandy Swamps, *Braun*, Oct. 1933 (G); MC CREARY: Pine Knot, *Pennell 13899* (ANS). TENNESSEE: FRANKLIN: Sewanee, *E. K. Smith*, ann. 1881 (W). MORGAN: Huffmans, *Pennell 13937* (ANS, UP). SCOTT: Winfield, *Pennell 13926* (ANS). ALABAMA: BALDWIN: Perdido, *Mohr*, Jun. 1890 (US). CHEROKEE: Round Mt., *Leeds*, Jun. 1934 (ANS). CULLMAN: Cullman, *Eggert*, Sep. 1897 (CM, US). ETOWAH: Ballplay, *Mohr*, Jy. 1890 (US). JACKSON: Flat Rock, *Wherry*, Jun. 1933 (ANS, UP). JEFFERSON: DeSoto Falls, *Ruth*, Jy. 1898 (NB, O, US). FLORIDA: GADSDEN: Quincy, *Chapman* (ANS). WALTON: DeFuniak Springs, *Curtiss 5902* (Del, M, NB, NYS, US). GEORGIA: BALDWIN: "*Dr. Boykin*, Ga.," Torrey herb. (NB). EMANUEL: Graymont, *Harper 814* (NB, US). IRWIN: Ocilla, *Harper 1418* (NB, US). LIBERTY: Sunbury, *L. LeConte* (NB). RICHMOND: Augusta, *Cuthbert*, Jun. 1900 (NB). SOUTH CAROLINA: AIKEN: Aiken, *Ravenel*, Aug. 1866 (NB). ANDERSON: Anderson, *Davis 8214* (US). DARLINGTON: Hartsville, *Norton*, Jy. 1920 (NYS, US). DORCHESTER: Summerville, *Brownfield* (US). GREENVILLE: Reedy River, *J. D. Smith*, Jy. 1881 (US). LANCASTER: Elgin, *House 2571* (US). PICKENS: Table Mt., *Small*, Aug. 1896 (NB). RICHLAND: Columbia, *Taylor* Jun. 1891 (M). SUMTER: Cane Savanna, *Stone 424* (ANS). NORTH CAROLINA: ANSON: Wadesboro, *Leeds*, Jy. 1929 (ANS). BRUNSWICK: Southport, *Blomquist 5027* (Duke). COLUMBUS: Hallsboro, *Wherry*, Sep. 1934 (UP). CRAVEN: New Bern, *Loomis and Croom* (ANS). CUMBERLAND: Fayetteville, *Biltmore herb. 624k* (NB). DURHAM: *Blomquist 5029* (Duke). HAYWOOD: Waynesville, *Huger* (NB). HENDERSON: Hendersonville, *Biltmore 624a* (NB, US). HYDE: Scranton, *Ashe*, Jun. 1898 (NC). IREDELL: Statesville, *Hyams* (M). JACKSON: Cashiers, *Pennell 14178* (ANS). JOHNSTON: Clayton, *Blomquist 5026* (Duke). MACON: Highlands, *Cuthbert*, Jy. 1897 (NB). MOORE: Pinehurst, *Wicker*, Sep. 1931 (NC). NEW HANOVER: Wilmington, *Coville 71* (US). ORANGE: Chapel Hill, *Totten*, Jun. 1915 (NC). PENDER:

Burgaw, *Hyams*, Aug. 1879 (US). ROWAN: Salisbury, *Heller 106* (ANS, NB). STANLEY: Falls of Yadkin, *Small and Heller*, Aug. 1891 (ANS). TRANSYLVANIA: Cedar Mountain, *Wherry*, Sep. 1934 (UP). VIRGINIA: ACCOMAC: Franklin City, Brown, Sep. 1907 (ANS). ELIZABETH CITY: Hampton, *Steele*, Aug. 1895 (US). GLOUCESTER: Ark, *Leonard and Killip 562* (ANS, US). GREENVILLE: "Belfield," *Heller*, Jun. 1893 (ANS, UP, US). HENRICO: Richmond, *Carter*, Sep. 1894 (ANS). JAMES CITY: Ewell, *Grimes 3901* (NB). NANSEMOND: Suffolk, *Kearney 1576* (US). NORFOLK: *Curtiss*, Jun. 1872 (NB). PRINCE GEORGE: New Bohemia, *Pennell 14425* (ANS). PRINCESS ANNE: Virginia Beach, *Britton et al.*, Jy. 1892 (NB). MARYLAND: HARFORD: Magnolia, *Carter*, Aug. 1904 (ANS). WICOMICO: Sharptown, *J. P. Otis* (?) *C1346* (herb. R.R.T.). WORCESTER: Ocean City, *Canby*, Jy. 1893 (Del). DELAWARE: NEWCASTLE: *Canby*, Aug. 1890 (Del). SUSSEX: Ellendale, *Tatnall 193* (herb. R.R.T.). PENNSYLVANIA: BUCKS: Yardley, *Dreisbach 3260* (ANS). DELAWARE: Tinicum Island, *A. H. Smith*, Jy. 1864 (UP). NEW JERSEY: ATLANTIC: Mays Landing, *Pennell 8117* (ANS). BURLINGTON: Atsion, *Long 6188* (ANS). CAMDEN: Lindenwold, *Long 26393* (ANS); CAPE MAY: Cold Spring, *Stone 13453* (ANS). CUMBERLAND: Dividing Creek, *Long 4808* (ANS). GLOUCESTER: Hardingville, *Long 32545* (ANS). MERCER: Bear Swamp, *Bartram*, Jy. 1913 (ANS). MIDDLESEX: Milltown, *Mackenzie 2803* (US). MONMOUTH: Farmingdale, *Stone 12706* (ANS). OCEAN: Lakehurst, *Long 16613* (ANS). SALEM: Auburn, *Tatnall*, Aug. 1927 (herb. R.R.T.). NEW YORK: NASSAU: Oceanside, *House* Jy. 1916 (NYS). QUEENS: Lawrence Sta., *Bisky*, Aug. 1886 (NB). SUFFOLK: Central Islip, *Ferguson*, Jy. 1920 (NYS).

20. L. FEAYANA Gray, Proc. Am. Acad. Arts Sci. XII: 60. 1877. TYPE LOCALITY: "Eastern and Southern Florida." TYPE SPECIMEN: Material cited by Gray (l. c.) seen in the Gray Herbarium.—Not *L. aphylla* Nuttall, Am. Jour. Sci. V: 297. 1822, which is not a *Lobelia;* see Nuttall in Jour. Acad. Phila. VII: 61–62. 1834. Perhaps *L. microphylla* Rafinesque, Atl. Jour. I: 147. 1832. The latter is described as follows: "Stem simple smooth, leaves minute remote ovate sessile dentate, flowers terminal few and small. Florida and Louisiana."—Stem weak, slender, decumbent or ascending, 5–30 cm. long, simple or diffusely branched, usually near the base; green, rarely purplish below, smooth, sometimes trailing and rooting at nodes. Cauline leaves 1–10, smooth, lanceolate or lance-ovate above, acute, denticulate, about 2.5 × 8.0 mm. Lower leaves broad-ovate or orbicular, 8–13 mm. in diameter, with a definite petiole sometimes 2.0 cm. long; entire or crenate-toothed. Basal leaves similar to the lower cauline ones. Rootstock slender, trailing. Inflorescence a lax terminal raceme 2–18 cm. long (often half the length of the entire plant), more or less secund, bearing 2–15 rather distant flowers upon smooth slender pedicels which are 4–7 mm. long in fruit, each with a pair of inconspicuous bracteoles near the base. Flower-bracts small,

inconspicuous, 1–3 mm. long, acute. Calyx in anthesis conic or short-campanulate, smooth, becoming turbinate in fruit, usually acute at the base, averaging 2.5 mm. in diameter, by about 3.5 mm. high. Capsule ⅔ or more inferior. Calyx-lobes narrowly lanceolate, smooth, entire, 2.0 mm. long. Auricles none. Flower 7–10 mm. long, including calyx. Corolla blue, with a white eye, and two greenish tubercles at the base of the lower lip; smooth, or the tube hairy inside. Corolla-tube entire, except for the dorsal fissure; lobes of the lower lip narrow-ovate, shorter than the tube; two upper lobes lanceolate, curved upward. Filament-tube about 3.0 mm. long, nearly smooth, connate more than half its length above, deflexed. Anther-tube 1.0–1.5 mm. long, bluish-gray, the two smaller anthers tufted at the tips, the three larger smooth or pubescent on the backs. Seeds rough-reticulate, ovate, about 0.5 mm. long.

This species is very close to *L. Nuttalli*, from which it differs by the weaker shorter stems, usually roundish lower leaves, general smoothness, including pedicels and calyx (in contrast to *L. Nuttalli*, which is often prickly), and the more elongate calyx. It is apparently not at all closely related to *L. Cliffortiana* L. and its relatives, as has been supposed by most American authors, but is in a wholly different section of the genus. It is, however, superficially like the plant passing for *L. Xalapensis* HBK. (*L. Cliffortiana* var. *Xalapensis* Gray), which may be distinguished by the *smooth shining seeds*, more upright, coarser leafy stems, longer inflorescence, serrate leaves.—Moist places, ditches, seashores, swamps, often in sandy places and pinelands; peninsular Florida; not seen from extreme southern Florida. Flower January–June, or more or less throughout the year. Representative material seen: FLORIDA: BREVARD: Cape Canaveral, *Curtiss 5831* (Del, M, NB, NYS). CHARLOTTE: Punta Gorda, *Leeds*, Apr. 1931 (ANS). DUVAL: Pablo, *Lighthipe 539* (M, NB, W). GLADES: Palmdale, *Leeds*, Apr. 1931 (ANS). HIGHLANDS: Sebring, Mar. 1935 (UP). HILLSBOROUGH: Tampa, *Churchill*, Mar. 1923 (ANS). INDIAN RIVER: Fellsmere, *Small 8891* (NB). LAKE: Lakeland, *Blanton 6971* (NB). LEE: Coconut, *Moldenke 695* (Duke, NB, UP). MANATEE: Bradentown, *Tracy 7510* (CM, M, UP, W). PINELLAS: St. Petersburg, *Mrs. Deam 5000* (M). ST. LUCIE: Fort Pierce, *Tatnall 864* (ANS). SARASOTA: Osprey, *B. H. Smith*, Mar. 1904 (ANS, CM). SEMINOLE: Sanford, *S.R.*, Apr. 1915 (NB). VOLUSIA: Mosquito Inlet, *Curtiss 1641** (CM, M, NB, UP).

FIG. 28. Range of LOBELIA FEAYANA.

21. L. KALMII Linnaeus, Spec. Pl. II: 930. 1753. TYPE LOCALITY: "Habitat in Canada." TYPE SPECIMEN: in the Linnaean herbarium

in London; collected by Kalm, and seen by Linnaeus before 1753. Photograph seen.—*Rapuntium Canadense, pumilum, Linariae folio Sarrac.*, Tournefort, Inst. R.H. 164. 1719. This is apparently the first mention in literature of this plant. The material was sent to Tournefort by Dr. Michel Sarrazin (1659-ca. 1736), who was at that time a physician in Quebec. *L. falcata* Rafinesque, N. Fl. N. Am. II: 18. 1836. *L. Kalmii* var. *strictiflora* Rydberg, Fl. Montana 378. 1900. Type Locality: "Rocky Mountain Region." Type Specimen: Teton R., Mont., *Scribner 130* (seen in ANS, Del, O); also Hurricane Hills, Assiniboia, *Macoun*, ann. 1883. The variety is said to differ from the typical form by the erect pedicels and the acute base of the capsules. However, these characters do not hold entirely, even in the type material (*Scribner 130*); moreover, the present writer has seen material from Montana and the mountains of British Columbia which exactly duplicates eastern material. It is thus thought best not to recognize the variety. *L. strictiflora* Lunell, Bull. Leeds Herb. No. 2: 8. Nov. 3, 1908.—Plants extremely variable in vegetative characters. Stems tall, slender, nearly unbranched, 15–35 (60) cm. high, green or reddish below, smooth or slightly pubescent near the base; varying to a diffusely branched form which is often stouter and shorter, and sometimes to a tufted form with stems 2–3 cm. high, forming a rosette-like mat. Cauline leaves 4–15, smooth, thin, subentire or shallowly dentate, with callose teeth; narrowly linear or lance-linear (in the unbranched form), 0.05–0.2 × 0.7–4.0 cm. In the branched or coarser plant; leaves broader, larger, 0.08–0.8 × 0.7–7.0 cm., oblanceolate or broader, even to narrow-ovate, usually obtuse, the lower sometimes narrowed into short petioles. Basal leaves if present few, spatulate or obovate, obtuse, petiolate, somewhat pubescent, often purplish, about 0.5 × 1.5 cm. (Maximum 0.8 × 3.5 cm.). Rootstock slender, sometimes elongate. Main inflorescence a loose terminal raceme, sometimes plainly secund, bearing 1–15 flowers upon long slender roughened pedicels (8–18 mm. long in fruit), each with a pair of conspicuous sub-opposite bracteoles near the middle. Pedicels loose, flexuous or stiffly appressed. Branch-racemes shorter than the central one, and developing later. Flower-bracts linear, smooth, about equalling the pedicel or longer (in the more luxuriant, branched plants). Calyx in anthesis conic or campanulate, smooth, becoming long-oval, oblong, or sub-globose in fruit, varying with age on the same plant (usually rounder when young). Capsule more than ¾ inferior, 3–6 mm. in diameter, by 4–9 mm. long. Calyx-lobes lanceolate or deltoid, 1.5–5.0 mm. long (ave. 2.5–3.5 mm.), smooth. Auricles none. Flower 7–16 mm. long, including calyx (ave. 10–13 mm.). Corolla blue, with a conspicuous white eye, or sometimes all white; smooth, or the tube hairy inside, the lower lip smooth. Corolla-tube entire, except for the dorsal fissure; lobes of the lower lip ovate, apiculate, equalling or exceeding the tube; two upper lobes lanceolate, curved upward. Filament-

tube 2.5–3.5 mm. long, smooth, connate above more than half its length. Anther-tube 1.6–1.8 (2.0) mm. long, bluish-gray, the two smaller anthers tufted, the three larger smooth or pubescent on the backs. Seeds long-fusiform, acute at both ends, 0.6–0.8 mm. long.

The diversity of form shown by this plant seems to be related to changes in habitat; it is a plant of calcareous situations, in general, and the slender, unbranched form is characteristic of grassy or marly bogs, while the coarser or more luxuriant form is known more from limy beaches or cliffs. All efforts to separate them by good characters, independent of habitat, have failed.—Wet meadows and bogs, in neutral or calcareous situations; shale or limestone beaches or cliffs;

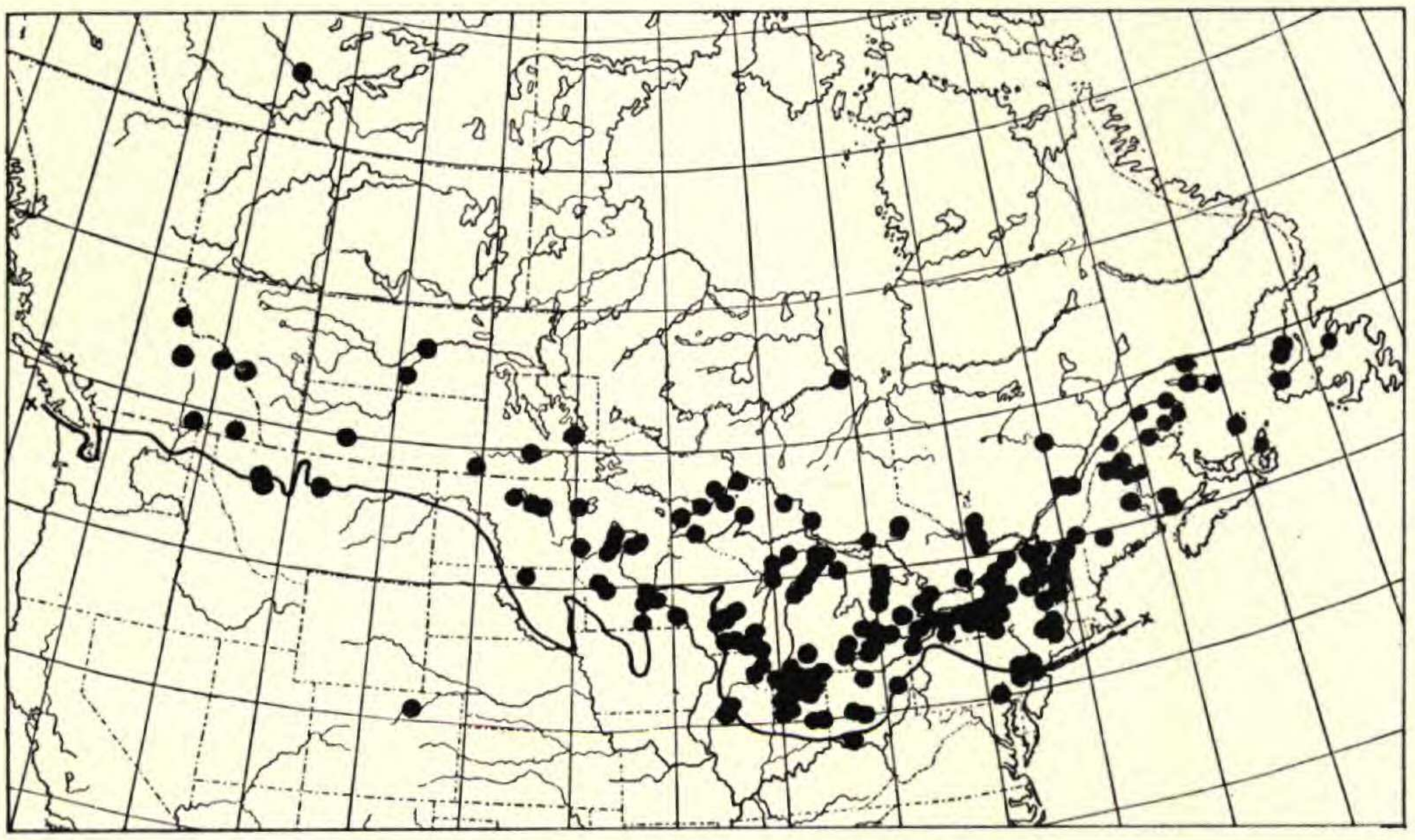

FIG. 29. Range of LOBELIA KALMII.

sometimes in sandy bogs; almost always in wet places. Newfoundland to western Massachusetts and south to the moraine in Pennsylvania (also Lancaster Co.); west to Ohio, Minnesota, and Colorado, north to Hudson Bay, Montana, British Columbia and Great Slave Lake. Absent from large regions of prevailingly acid soil. Flower July 1–September 1. Fruit July 20–September 20. So characteristic that it is unnecessary to cite the abundant material seen, except for the following outlying stations. PENNSYLVANIA: LANCASTER: Dillerville Swamp, *Heller*, Sept. 1901 (CCD, CU, W). ONTARIO: COCHRANE: James Bay, mouth of Albany River, *Spreadborough*, herb. G. S. Can 62542(O). MACKENZIE: sandy muskeag, N. arm, Great Slave Lake, *G. S. Hume*, Jy 31, 1920(O). COLORADO: LARIMER: Fort Collins, *Baker*, Aug. 1896 (CM).

22. L. DORTMANNA Linnaeus, Spec. Pl. II: 929. 1753. TYPE LOCALITY: "Habitat in Europae frigidissimae lacubus & ripis."

Type Specimen: in Linnaean Herbarium in London; seen by Linnaeus before 1753. Photograph seen.—*Gladiolus lacustris Dortmanni*, Clusius, "Curae posteriores," 40. 1611. *Leucoium palustre flore subcaeruleo*, Bauhin, "Pinax," 202. 1623. *Dortmanna lacustris floribus sparsis pendulis*, Rudbeck, Act. ups. 1720. p. 97. t. 2 (according to Linnaeus). *L. foliis bilocularibus subulatis*, Linnaeus, Fl. lapp. 227. 1737.—Aquatic; smooth throughout. Stem upright, unbranched (rarely with 1–2 branches), 5–100 cm. high (ave. 30–35 cm.), usually immersed about ⅔ of its height (all except the inflorescence); green above water, and green to stramineous below, leafless, bearing 0–7 linear fleshy bracts 1–7 mm. long; stem hollow. Leaves basal (rarely developing 1–3 cauline leaves 2–4 cm. long), linear, entire, fleshy, in number 2–27 (ave. 15–20), 2.0–5.0 (8.0) cm. long by 1.0–4.0 mm. wide, when flattened out; obtuse or short-acute. Inflorescence a lax terminal raceme to 45 cm. long (ave. 10–20 cm.),

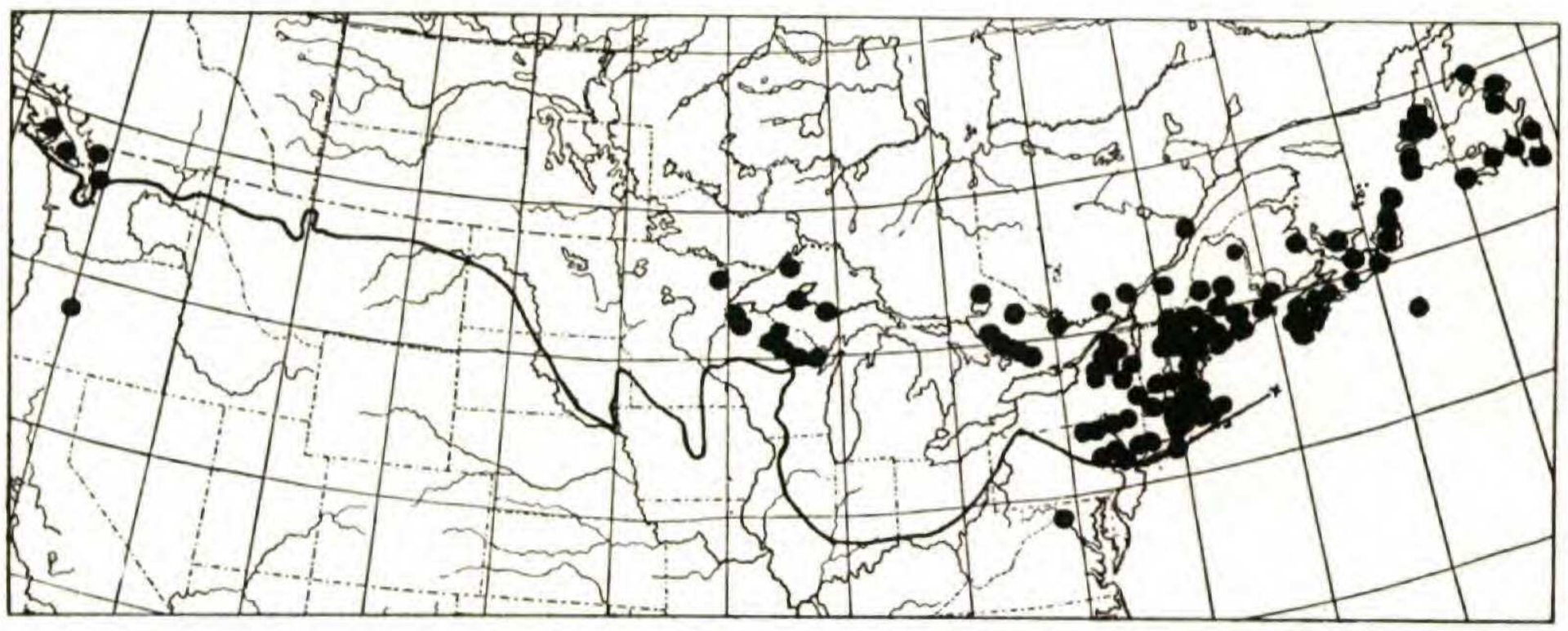

Fig. 30. American Range of Lobelia Dortmanna.

often more or less secund, very loosely 1–11 flowered (ave. 5–6). Pedicels in fruit 4–13 mm. long (ave. about 7.0 mm.), curved, elongating in fruit and curving further, so that the flower is often horizontal, while the fruit is pendent. Bracteoles of pedicel none. Flower-bracts obtuse, fleshy, entire, 2–3 mm. long, with a broad base. Calyx in anthesis conic or long-triangular, becoming long-cylindric, barrel-shaped or obconic in fruit, usually with a long-attenuate base, in size 4–5 × 6–12 mm. Capsule ¾ or more inferior. Calyx-lobes short-lanceolate or deltoid, blunt, 1.5–2.5 mm. long. Auricles none. Flower 12–22 mm. long, including calyx (N.B. In this species the length of the flower is very variable, with the youngest flowers of a well-developed inflorescence often appearing the smallest. This tendency is seen throughout the group, but not so strikingly as in *L. Dortmanna.*). Corolla pale violet-blue to white, pubescent at the base of the lower lip, otherwise smooth. Corolla-tube entire except for the dorsal fissure, which may extend only to within 1–2 mm. of the base. Lobes of the lower lip long-ovate, nearly equalling the tube,

not sharply reflexed; two upper lobes linear, curved upward. Filament-tube 4–6 mm. long (ave. about 4.5), pubescent below, connate most of its length above. Anther-tube 1.3–1.7 mm. long, dark gray or black, the two smaller anthers heavily tufted, the three larger densely bearded, especially near the tip. Seeds dark brown, with a prominent square base at one end.—Sandy or gravelly borders of ponds, usually partly immersed; more rarely in mud or in quiet streams; Newfoundland and central Ontario to northern Pennsylvania, west to northern Minnesota; also in Oregon, Washington and British Columbia; Slave Lake, *Richardson* (Hooker, Fl. Bor.-Am.). Apparently identical with the plant of northwestern Europe. Flower July 1–September 1. Fruit July 15–September 15. So distinct that it is unnecessary to cite the specimens seen, except from the following outlying localities. WEST VIRGINIA: A specimen in the Detwiller herbarium in the Academy of Natural Sciences of Philadelphia is labelled: "nr. Harpers Ferry, Virg. Aug. 14, 1846." The Detwiller herbarium is mostly from near Mercersburg, Pa., and it is possible that the above collection is from Pennsylvania or even further north. OREGON: JEFFERSON: Cascade Mts., Dark Lake, *Sweetser*, Aug. 1926 (ANS).

EXPLANATION OF ABBREVIATIONS FOR HERBARIA

Ab = University of Michigan, Ann Arbor, Mich.; ANS = Academy of Natural Sciences, Philadelphia, Penna.; CCD = Herbarium of Chas. C. Deam, Bluffton, Indiana; CM = Carnegie Museum, Pittsburgh, Penna.; CU = Cornell University, Ithaca, New York; Del = Delaware Society of Natural History, Wilmington, Del.; Duke = Duke University, Durham, N. C.; G = Gray Herbarium, Harvard University, Cambridge, Mass.; herb. R.R.T. = Herbarium of R. R. Tatnall, 1100 W. 10th St., Wilmington, Del.; M = University of Minnesota, Minneapolis, Minn.; Miss = Mississippi State College, State College, Miss.; Mo = Missouri Botanical Garden, St. Louis, Mo.; NB = New York Botanical Garden, Bronx Park, N. Y.; NC = University of North Carolina, Chapel Hill, N. C.; NE = New England Botanical Club, Gray Herbarium, Harvard Univ.; NYS = Herbarium of New York State Museum, Albany, N. Y.; O = National Museum of Canada, Ottawa, Ont.; Pa = Pennsylvania State Herbarium, Harrisburg, Penna.; R = Rocky Mountain Herbarium, Univ. of Wyoming, Laramie, Wyo.; Toronto = Toronto University, Toronto, Ont.; UGa = University of Georgia, Athens, Ga.; UP = University of Pennsylvania, Philadelphia, Penna.; US = U. S. National Museum, Smithsonian Institution, Washington, D. C., W = University of Wisconsin, Madison, Wis.; WVa = West Virginia University, Morgantown, W. Va.

EXPLANATION OF PLATE 435

FIG. 1, L. CLIFFORTIANA L. (possibly *L. xalapensis* HBK.); FIG. 2, L. FEAYANA Gray; FIG. 3, L. NUTTALLI R. & S. (one seed of *L. Cliffortiana* L. may be seen near the top of the picture); FIG. 4, L. GATTINGERI Gray; FIG. 5, L. CANBYI Gray: FIG. 6, L. SPICATA Lam., var. ORIGINALIS McVaugh; FIG. 7, L. SPICATA Lam., var. CAMPANULATA McVaugh; FIG. 8, L. PUBERULA Mx.; FIG. 9, L. KALMII L.; FIG. 10, L. GLANDULOSA Walt.; FIG. 11, L. FLORIDANA Chapm.; FIG. 12, L. INFLATA L.; FIG. 13, L. DORTMANNA L.; FIG. 14, L. AMOENA Mx.; FIG. 15, L. SIPHILITICA L.; FIG. 16, L. CARDINALIS L.

The seeds photographed were from the following specimens:

Fig. 1, Brooksville, Hernando Co., Fla., *Leeds*, Apr. 1931 (ANS); Fig. 2, *Mrs. Deam 5000* (M); Fig. 3, Wadesboro, Anson Co., N. C., *Leeds*, Jy. 1929 (ANS); Fig. 4, "cedar barrens," Jun. 1879, *Gattinger* (Mo); Fig. 5, Ellendale, Sussex Co., Del., *Commons*, Sep. 1895 (ANS); Fig. 6, Madalin, Dutchess Co., N. Y., *McVaugh 2674* (UP); Fig. 7, *House 20543* (NYS); Fig. 8, *Deam 35293* (ANS); Fig. 9, *Ehlers 1313* (ANS); Fig. 10, Miami, Dade Co., Fla., *Meredith*, Mar. 17, 1917 (ANS); Fig. 11, *Pennell 4186* (UP); Fig. 12, *Strausbaugh 309* (WVa); Fig. 13, Greenfield, Hillsboro Co., N. H., *Batchelder*, Aug. 14, 1911 (ANS); Fig. 14, *Biltmore herb. 622c* (UP); Fig. 15, *House 19001* (NYS); Fig. 16, *House 18994* (NYS).

The photographs of seed were all taken with the aid of a Bausch and Lomb 48 mm. microtessar lens. The magnification is approximately 12x.

Explanation of Text Figures

The lines showing the glacial moraines are taken from Antevs (*2*), and the position of the Fall Line is essentially that shown by Fenneman (*16*). A few records on the maps are indicated by circles rather than solid dots; these are doubtful either as to exact locality or as to exact identity of the plant in question.

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NOTES ON THE FLORA OF MICHIGAN—I[1]

FREDERICK J. HERMANN

THE records for the species here reported are based upon collections of either Mr. C. R. Hanes, of Schoolcraft, Michigan, or of the writer. Both Mr. Hanes' collections and the writer's are represented in the Herbarium of the University of Michigan, and duplicates of most of the writer's specimens have also been rather widely distributed among the larger herbaria of the eastern states. Determinations for Mr. Hanes' grasses have been verified by either Professor Hitchcock or Mrs. Chase, and for the confirmation of his other reported species the writer assumes the responsibility. Unless otherwise indicated,

[1] Paper from the Department of Botany and Herbarium of the University of Michigan, No. 576.